What Is Binary?

Binary *is a system of numerical notation that uses a base 2 system, opposed to the conventional `denary'/base 10 system.*

What is a base two system?

- *The everyday counting system that we use is known as a base 10 system. This means that we have the ten numbers 0 to 9. When another digit is required, we round up and use a new place value.*
- *In a base two system, there are only two numbers available (0 and 1). When a digit higher than a binary 1 is required, an increment resets the 1 to a 0 and an increment of the next digit to the left is produced.*
- *Each digit moving from left to right in binary represents a higher power of 2 when comparing to the base 10 system.*

i.e. The index of 2 by which each digit represents increase by 1 successively from left to right.

Base 10 representation	**128**	**64**	**32**	**16**	**8**	**4**	**2**	**1**
Index representation	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Binary	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*

The uses of binary

- *Computers are based on logic gate circuits. Their circuits can only understand two states: 1 and 0, on or off respectively. It is very easy to represent these two states in the circuits and therefore binary is also used for all data and instructions too.*

- *This includes: numbers, text, images, sound and program instructions.*

- *Each binary digit is referred to as a bit. Eight bits are referred to as a byte, while 4 bits (half a byte) is called a nibble.*
- *The highest number that eight bits can achieve is 256 (including 0) – calculated by $2^8 = 256$*
- *If a higher number needs to be stored then more bits are required.*

File sizes

- *1 Bit = A single 1 or 0*
- *1 Nibble = 4 bits (half a byte)*
- *1 byte = 8 bits*
- *1 Kilobyte = 1024 bytes*
- *1 Megabyte = 1,028,576 bytes (1024*1024)*
- *1 Gigabyte (GB) = 1,073,741,824 bytes (1024*1024*1024)*
- *1 Terabyte = 1024^4 bytes = 1024 Gigabytes*

File	Size
One character of text	1 byte
A full page of text	30 KB
One small digital colour photograph	3 MB
Music CD	600 MB
A DVD	4.5 GB
Hard disk	1 TB

https://docs.google.com/forms/d/e/1FAIpQLScEKSu2PQigVChvOQ8qMJDvi-f2MKBBmedqy309miO5E3H2GA/viewform

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Answers beneath this box